

**Solutions to Exercises in
Economics of Banking
Chapter 14**

1. If there is another investment option from $t = 1$ to $t = 2$, two problems arise in the Diamond-Dybvig model:

(1) To find the efficient allocation, maximizing expected value of $\pi u(c_1) + (1 - \pi)u(c_2)$, we must take into account that if $\tilde{\rho}$ is sufficiently high, it may be better for society to use this option than the 2-period investment. But the latter must be decided at $t = 0$, and in the maximum (at least assuming that liquidation value at $t = 1$ is low) this means that less is invested, and some surplus liquidity is kept for investment at $t = 1$. Thus, I^* will be lower than in the standard model, and in the optimal contract, the withdrawal c_1^* will depend on the value of $\tilde{\rho}$: For small values of $\tilde{\rho}$ it is determined as before, satisfying $\pi c_1^* = 1 - I^*$, but for high values of $\tilde{\rho}$ it can be slightly higher, allowing the early withdrawers to benefit from the additional gains obtained by investing the liquid reserve.

(2) To make sure that patient consumers do not withdraw and invest for high values of $\tilde{\rho}$, we must also have in this case that $c_2^* = \rho c_1^* = c_2^*$, and this determines c_1^* for high values of $\tilde{\rho}$ as

$$c_1^* = 1 + \left(\frac{R}{\rho} - 1\right)I^*,$$

since the budget equation

$$\pi c_1 + (1 - \pi)\frac{1}{\rho}c_2 = 1 + \left(\frac{R}{\rho} - 1\right)I$$

must be satisfied when ρ is greater than R .

2. Since all banks are affected by the general lack of confidence of depositors, attempts by any single bank to keep business at the usual level will be of little effect. In addition, if depositors withdraw funds from the bank, it cannot maintain the usual level of borrowing and may even be forced to terminate rather than renew existing contracts.

To prevent depositors from moving their deposits from one bank to some other and then perhaps to a third bank, depositors should be guaranteed against losses caused by defaults of any single bank. The standard way to achieve this is a system of deposit insurance, to be considered later in Chapter 15.

3. The bank needs to set aside an additional amount of liquidity at some date t without interfering with the contracts made with existing depositors and borrowers. It may then act in the same way as in the repo run model considered in 14.7.3: The additional liquidity at t is taken from the deposits of this period, and the new loans are reduced with this amount.

The loss of interest income means that future profits are reduced, if they become negative, the new deposits are once again used to make up for the deficit, etc. In the long run, the bank will return to the previous level of activity but with a higher liquidity reserve.

It should be noticed that for this to work, it is necessary that the bank is earning some positive profit in each period.

4. The system outlined corresponds to a forced sale of the assets of a bank triggered by a fixed solvency ratio. The buyers of bank assets are other banks, that is the business partners of the bank which is in trouble.

When the sale takes place, the banks have an interest in obtaining as low a price for the assets as possible, and they may have access to information about the qualities of the assets which are not available to the government agency in charge of the sale. This seems to imply only a possible transfer of future profits between banks. However, it has also implications for the situation of the bank in trouble when it is approaching the solvency rate triggering a forced sale, but has not yet reached it: Banks are connected in daily trading and in the interbank market, and the other banks may restrict their credit to the troubled bank since this will provoke a forced sale with the resulting possibilities of gains achieved from taking over its assets.

As a consequence, there will be a range of solvency ratios above the critical one such that banks which reach these levels of solvency are subsequently brought to a forced sale, and during the period of taking over, first by the government agencies and then by other banks, the usual working of the credits supplied by the bank will be upset, some credits will be cancelled and new credits are not initiated, with unavoidable negative effects on the economy.

5. If the value of the securities posted as collateral in a repo trade is decreasing, then either the bank must reduce the volume of repo contracts, which means that funding is reduced, or it must post more securities as collateral for the given repo contracts. Assuming that all shadow banks are affected by this downward trend in security prices, the additional collateral can be obtained by new securitization of loans, but this may affect security prices negatively, causing a further need for increased haircuts.

The process will depend on the market for securities and may converge to a new and higher stable level of collateral, but it might as well continue, in which case one would probably observe a finer differentiation in the type of securities which can be posted as collateral.